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Impact of solid waste disposal on nutrient dynamics in a sandy catchment

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Titre	Impact of solid waste disposal on nutrient dynamics in a sandy catchment
Type de publication	Article de revue
Auteur	Canton, Mathieu [1], Anschutz, Pierre [2], Naudet, Véronique [3], Molnar, Nathalie [4], Morteau, Hélène [5], Franceschi, Michel [6], Naessens, Fabien [7], Poirier, Dominique [8]
Editeur	Elsevier
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Année	2010
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Résumé en anglais	Groundwaters impacted by mature landfill leachate are generally enriched in ammonium. In order to assess the dynamics of ammonium exchanges between leachates and the water system inside a sandy permeable catchment we measured ammonium, nitrate and chloride concentrations in the stream and in sediment pore waters of the streambed of a landfill impacted aquifer. Geophysical investigation methods complemented the biogeochemical survey. The studied zone is a 23 km² catchment located in a coastal lagoon area sensitive to eutrophication risk. Ammonium concentrations in the river were up to 800 µmol l−1 during low water period in summer. Three surveys of the river chemistry showed a regular increase in ammonium, nitrate and chloride concentrations along a 1 km section of the watercourse, downstream the landfill, implying that the leachate plume exfiltrates along this section. Sediment cores collected within this section showed all an increase in ammonium concentrations with depth in pore waters as a consequence of the landfill leachate dispersion, as attested by a simultaneous increase in chloride concentrations. Nitrate enrichment in the river water was due to nitrification of ammonium at the interface between groundwater and streamwater. The apparent nitrification rate obtained was within values reported for turbid estuaries, although the river contained very little suspended particulate matter. Actually, pore water chemistry suggests that nitrification occurred for the most part in subsurface permeable sediments, rather than in stream water. The overall topographic, hydrological, geochemical, and geoelectrical data set permit to estimate the extension of the chloride and ammonium plume. The estimation of the apparent ammonium plume velocity is 23 m year−1 whereas the chloride plume velocity should be 50 m year−1. The river is the outlet of the impacted groundwaters. Considering that the input of ammonium from the landfill is balanced by the present day output via the river, the residence time of ammonium in the aquifer is between 7 and 18 years.
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Liens

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